

WHAT IS CLAIMED IS:

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1. An apparatus for generating structural data of a structure comprising:

a scanning laser range finder that produces reflectance data of the structure;

a memory which stores the reflectance data; and

means for determining desired spatial relationships of the structure from the reflectance data.

2. An apparatus as described in Claim 1 wherein the determining means includes interface means for allowing desired spatial relationships to be chosen.

3. An apparatus as described in claim 2 wherein the data includes a reflectance image and a point cloud of the structure that are produced simultaneously by the laser range finder.

4. An apparatus as described in Claim 4 wherein the reflectance image is provided to the interface means which allows a user to work with the reflectance image that is a 2D representation of the point cloud which is a 3D representation of the structure.

5. An apparatus described in Claim 4 wherein the data includes distance measurements and reflectance measurements of the structure that have a direct correspondence.

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6. An apparatus as described in Claim 5 wherein the reflectance image is formed from reflectance measurements and range data.

7. An apparatus as described in Claim 5 wherein the determining means determines a location of a discrete point in absolute coordinates of the structure; or distances between two discrete locations of the structure; or perpendicular and straight line distances between two edges in the structure; or diameters, centerlines and orientations of pipes in the structure; or perpendicular distances between pipe centerlines of the structure; or dimensions of structural elements; or nominal or standard sizes of components of the structure; or dimensions of flanges, nozzles and other pipe connections of the structure; distances between two planes of the structure; or 2D area measurements of the structure; or 3D volume measurements of the structure; measurements of multiple reflectance images of the structure; or location and orientation of planar surfaces of the structure.

8. A method for generating structural data of a structure comprising the steps:

producing reflectance data of the structure with a scanning laser range finder;

storing the reflectance data in a memory; and

determining desired spatial relationships of the structure from the reflectance data.

9. A method as described in Claim 8 wherein the determining step includes the step of choosing desired spatial relationships.

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10. A method as described in Claim 9 wherein the producing step includes the step of producing a reflectance image and a point cloud of the structure simultaneously by the laser range finder.

11. A method as described in Claim 10 wherein the choosing step includes the step of providing the reflectance image to an interface means which allows a user to work with the reflectance image that is a 2D representation of the point cloud which is a 3D representation of the structure.

12. A method as described in Claim 11 wherein the data includes distance measurements and reflectance measurements of the structure that have a direct correspondence.

13. A method as described in Claim 12 wherein the producing the reflectance image step includes the step of forming the reflectance image from reflectance measurements and range data.

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